

REMARKS/ARGUMENTS

The arguments and amendments submitted herein incorporate the patentability arguments and amendments Applicants discussed with the Examiner during the phone interview on August 1, 2007. During the interview, Applicants discussed amendments to the claims that the Examiners indicated would appear to distinguish over the cited art, but that they may update their search. Applicants submit that the arguments and amendments presented herein make the substance of the phone interview of record to comply with 37 CFR 1.133. If the Examiner believes that further information on the interview needs to be made of record to comply with the requirements, Applicants request the Examiner to identify such further information.

1. Claims 1-3, 7-9, 10-12, 16-18, 19-21, 23-25, and 29-31 are Patentable Over the Cited Art

The Examiner rejected claims 1-3, 7-9, 10-12, 16-18, 19-21, 23-25, and 29-31 as anticipated (35 U.S.C. §102(b)) by Lawrence (U.S. Patent No. 6,253,300). Applicants traverse with respect to the amended claims.

Amended claims 1, 10, 19, and 23 require: receiving an I/O request to write an update to an object in storage; defragmenting the object in storage so that blocks in storage including the object are contiguous in response to receiving the I/O request to write the update to the object, wherein the request to write the update to the object causes the defragmentation operation; and executing the I/O request to write the update to the object in storage.

Applicants amended these claims as discussed during the phone interview to recite that the update to the object is a write to update the object. This added requirement is disclosed on at least para. [0016], pg. 5. Further, the Specification discloses that the defragmentation operations are initiated upon receiving an I/O request (para. [0011], pg. 3), which includes write requests. The Examiner indicated that this amendment would likely distinguish over the cited art but that the search may be updated.

Applicants further amended claims 10 and 19 to remove the reference numerals for the claim limitation.

The Examiner cited col. 5, lines 37-42 of Lawrence as teaching the claim requirement of defragmenting the object in storage so that blocks in storage including the object are contiguous in response to receiving the I/O request. (Third Office Action, pgs. 4-5)

The cited col. 5 mentions that each file is stored in several locations separated by regions of the storage medium that do not hold the file's contents and that fragmentation can be alleviated or eliminated by running a defragmentation program on the files before copying them.

Nowhere does this cited col. 5 anywhere disclose the claim requirement that an I/O request to write an update to the object causes defragmentation of the object. Instead, the cited col. 5 mentions that a defragmentation program can be run on files before copying them. Although one may run a defragmentation program at any time, after or before copying data, the cited col. 5 still does not disclose defragmenting an object in response to receiving an I/O request to write the update the object to which the defragmentation is directed. Applicants submit that defragmentation files before copying the files does not disclose performing a defragmentation of an object in response to an I/O request to write to the object.

In the Response to Arguments, the Examiner argued that an update to the object may comprise a deletion. (Third Office Action, pg. 2) Col. 6, lines, lines 11-19 and 33-44 of Lawrence discuss steps a user may perform, such as deleting files from partition S1 to create S1' on the source disk, defragments S1' to create defragmented S1'', then shrinks S1'' to S1''', and then expands S2 partition to S2' and copies S1''' to S2'. The cited col. 6 mentions performing the file deletion, defragmentation of the partition, and partition resizing on-the-fly with imaging.

Although the cited col. 6 of Lawrence discusses defragmenting in the context of deleting files, there is no disclosure of the claim requirement of performing a defragmentation of an object in response to an I/O request to write to the object.

Applicants further note that the cited Lawrence discusses defragmenting a partition, S1 and S2, when deleting files from the partition. The claims concern defragmenting an object when writing an update to the object. Thus, the cited Lawrence does not disclose performing an update with respect to an object when there is a write to the object, but instead concerns defragmenting a partition when files from the partition are deleted.

Accordingly, amended claims 1, 10, 19, and 23 are patentable over the cited art because the cited Lawrence does not disclose all the claim requirements.

Claims 2, 3, 7-9, 11, 12, 16-18, 20, 21, 24, 25, and 29-31 are patentable over the cited art because they depend from one of claims 1, 10, 19, and 23, which are patentable over the cited art for the reasons discussed above. Moreover, the following of these dependent claims provide additional grounds of patentability over the cited art.

Amended claims 3, 12, 20, and 25 depend from claims 1, 10, 19, and 23, respectively, and further require determining whether an amount of fragmentation of the object in the storage exceeds a fragmentation threshold indicating an acceptable number of bytes stored in non-contiguous locations in response to receiving the I/O request, wherein the object is defragmented if the amount of fragmentation exceeds the fragmentation threshold, and wherein the I/O request to update the object is executed without defragmenting the object in response to determining that the amount of fragmentation does not exceed the fragmentation threshold.

Applicants amended these claims as discussed during the phone interview to recite that the fragmentation threshold indicates an acceptable number of bytes stored in non-contiguous locations. This added requirement is disclosed on at least para. [0012], pg. 4 of the Specification. The Examiner indicated that this amendment would likely distinguish over the cited art but that the search may be updated.

The Examiner cited col. 5, lines 37-39 as disclosing the additional requirements of these claims (Third Office Action, pg. 5).

The cited col. 5 mentions that fragmentation can be eliminated or alleviated by running a defragmentation program on the files before copying them. Nowhere does this cited col. 5 anywhere disclose determining whether an amount of fragmentation of an object exceeds a threshold indicating an acceptable number of bytes stored in non-contiguous locations in response to receiving a request to write update an object. Instead, the cited col. 5 mentions that one may run the defragmentation program to alleviate or eliminate fragmentation before copying files.

In the Response to Arguments, the Examiner found that that the fragmentation threshold may correspond to zero, where no defragmentation is performed if defragmentation is zero. (Third Office Action, pg. 2). Applicants submit that the Examiner's finding of a zero does not disclose the added claim requirement that the fragmentation of an object exceeds a threshold indicating an acceptable number of bytes stored in non-contiguous locations. Thus, the claims require a defragmentation threshold of an acceptable number of bytes stored in non-contiguous locations, which is non-zero. Thus, the cited threshold of zero does not disclose this claim requirement.

Accordingly, amended claims 3, 12, 20, and 25 provide additional grounds of patentability over the cited art because the additional requirements of these claims are not disclosed in the cited Lawrence.

Claims 8, 17, and 30 depend from claims 1, 10, and 23 and further require operations of receiving the I/O request, initiating the operation to defragment the object, and executing the I/O request of defragmenting the object in storage are performed by a storage controller managing I/O requests to the storage.

The Examiner found that that Lawrence discloses this requirement because the defragmentation occurs in a computer and the computer inherently includes a storage controller and device driver. (Third Office Action, pg. 6) Applicants traverse this finding because there is nothing inherent that defragmentation be initiated by the storage controller as opposed to some other computer component. According to the Manual of Patent Examination and Procedure (MPEP), the “fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic.” MPEP Sec. 2112, pg. 57 (Aug. 2005, Rev. 3). Thus, the fact that defragmentation “may” be initiated in the storage controller as opposed to a program in the computer makes this finding of inherency inappropriate.

The Examiner found that

applicant argues that since the function can be performed by “a program”, the storage controller/device driver is patentably distinct. However, even if Lawrence discloses “a program” like the application assumes, “a program” cannot produce tangible results without being executed in hardware.

(Third Office Action, pg. 3).

Applicants have not argued that since the function can be performed by a program the storage controller is patentably distinct. Instead, Applicants point out that the cited Lawrence does not disclose that the storage controller performs defragmentation, as opposed to some other computer component, in response to the I/O request. Thus, claims 8, 17, and 30 provide additional grounds of patentability over the cited art because the additional requirements of these claims are not disclosed in the cited Lawrence.

Claims 9, 18, and 31 depend from claims 1, 10, and 23 and further require that the operation of defragmenting the object in storage is performed by a device driver for the storage providing an interface to the storage.

As with claims 8, 17, and 30, Applicants submit that the claims are patentably distinct because the Examiner has not shown where the cited Lawrence discloses that defragmentation is performed by a device driver for the storage providing an interface to the storage as opposed to some other software program, such as an application program or utility. Thus, it is not inherent that a device driver perform the defragmentation.

Accordingly, claims 9, 18, and 31 provide additional grounds of patentability over the cited art because the additional requirements of these claims are not disclosed in the cited Lawrence.

2. Claim 22 is Patentable Over the Cited Art

The Examiner rejected claim 22 as obvious (35 U.S.C. §103(a)) as obvious over Lawrence in view of Karger (U.S. Patent No. 5,339,449). (Third Office Action, pg. 7)

Applicants submit that claim 22 is patentable over the cited art because it depends from claim 19, which is patentable over the cited art for the reasons discussed above.

3. Claims 4, 5, 13, 14, 26, and 27 are Patentable Over the Cited Art

The Examiner rejected claims 4, 5, 13, 14, 26, and 27 as obvious over Lawrence in view of Dougliis (U.S. Patent Pub. No. 2005/018075). (Third Office Action, pgs. 8-9) Applicants traverse.

Applicants submit that these claims are patentable over the cited art because they depend from one of claims 1, 10, and 23, which are patentable over the cited art for the reasons discussed above. Moreover, the below discussed dependent claims provide additional grounds of patentability over the cited art for the following reasons.

Claims 4, 13, and 26 depend from claims 1, 10, and 23, respectively, and further require determining whether a user settable flag indicates to perform defragmentation in response to receiving the I/O request, wherein the object is defragmented if the flag indicates to perform defragmentation.

The Examiner cited para. [0032] of Dougkis as teaching the additional requirements of these claims. (Third Office Action, pg. 8)

The cited para. [0032] discusses a power-aware monitor that monitors applications to defer execution of non-critical background tasks, that may be daemons or other application and whose execution is desirable only when there is not a restriction on power usage. Examples include full disk virus scans and defragmentation, among others.

Although the cited para. [0032] discusses a power monitor deferring defragmentation to execute when there is no restriction on power usage, nowhere does the cited para. [0032] anywhere teach or suggest a user settable flag that indicates to perform defragmentation in response to receiving the I/O request, which is to update the object. Instead, the cited para. [0032] discusses deferring defragmentation for power management concerns, not indicating whether to perform a defragmentation in response to an I/O request as claimed.

Accordingly, claims 4, 13, and 26 provide additional grounds of patentability over the cited art because the additional requirements of these claims are not disclosed in the cited Lawrence or Dougkis.

4. Claims 6, 15, and 28 are Patentable Over the Cited Art

The Examiner rejected claims 6, 15, and 28 as obvious (35 U.S.C. §103) over Lawrence in view of Ball (U.S. Patent Pub. No. 2005/0162944). (Third Office Action, pg. 9) Applicants traverse.

Applicants submit that these claims are patentable over the cited art because they depend from one of claims 1, 10, and 23, which are patentable over the cited art for the reasons discussed above. Moreover, these claims provide additional grounds of patentability over the cited art for the following reasons.

Claims 6, 15, and 28 depend from claims 1, 10, and 23 and further require determining at least one logical partition including the object, wherein the object is defragmented if the object is within one logical partition and the I/O request to update the object is executed without defragmenting the object in response to determining that the object is included in more than one logical partition.

The Examiner cited the Abstract and para. [0024] of Ball as teaching the additional requirements of these claims. (Third Office Action, pgs. 9-10) Applicants traverse.

The cited Abstract discusses a redundant memory architecture having an active memory and an inactive memory. The active memory supports in-service storage operations. The inactive memory is updated with stored contents of the active memory. Stored contents of the inactive memory are defragmented prior to an activity switch that results thenceforth in the inactive memory assuming the in-service storage operations and the active memory being updated with the stored contents of the inactive memory. The cited para. [0024] of Ball mentions that the defragmentation can be performed on an inactive redundant memory, such that the in-service performance of a counterpart active memory need not be impacted.

Nowhere does the cited Ball anywhere disclose or mention defragmenting the object to update in response to determining that the object is included within one logical partition. Instead, the cited Abstract mentions that the inactive memory is defragmented prior to an activity switch that results in the inactive memory assuming the in-service storage operations and that the defragmentation can be performed on an inactive redundant memory.

Accordingly, amended claims 6, 15, and 28 provide additional grounds of patentability over the cited art because the additional requirements of these claims are not taught or suggested in the cited Lawrence and Ball.

Conclusion

For all the above reasons, Applicant submits that the pending claims 1-31 are patentable over the art of record. Applicants have not added any claims. Nonetheless, should any additional fees be required, please charge Deposit Account No. 50-0585.

The attorney of record invites the Examiner to contact him at (310) 553-7977 if the Examiner believes such contact would advance the prosecution of the case.

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